

*Powering Business Worldwide*

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# Part Identification - 220 Series Pumps

Item	Part Number	Quantity	Description	Page Number
1	See table 1	1	Shaft, Drive	7
2	6028118-XXX	AR	Spacer, Bearing / Bearing Shim Kit ■	18
3	See table 1	1	Key, Driveshaft	7
4	See Table 2	1	End Cover S/A	8
5	16026-610	1	Roll Pin	–
6	See table 3	1	Valve Plate	9
7	104166-156	1	O-Ring ●	–
8	See table 4	1	Housing	10
9	388153	1	Bearing Assembly, Shaft (Front)	–
10	02-335336	1	Bearing Assembly, Shaft (Rear)	–
11	6026924-001	2	Bearing, Swash Plate	–
12	114995-010	2	Screw, Cap, Socket	–
13	5992034-001	1	Spring, Bias	–
14	6026917-001	1	Swash Plate	10
15	6026982-001	1	Rotating Group S/A	10
16	114977-035	4	Screw, Cap (Housing / End cover)	–
17	16253-218	1	Seal, Shaft, Fluorocarbon ●	10
18	16077-032	1	Ring, Retaining, Internal (Shaft Seal) ●	–
19	See Table 8	1	Compensator S/A	11
20	107275-011	4	O-Ring (Secondary Compensator / Housing) ●	–
21	107275-017	1	O-Ring (Compensator / Housing) ●	–
22	114953-030	4	Screw, Cap (Compensator Mounting)	–
23	6030097-001	1	Piston, Control	–
24	16103-312	1	Plug, Fixed Volume Stop ◆	–
25	16103-302	3	Plug	11
26	See table 9	3	Plug (Bottom, Top and Side Case Drain Ports)	11
27	See table 9	1	Plug (Vertical Case Drain Port)	11
28	See table 9	1	Plug (Diagnostic Port)	11
29	6026914-001	1	Link, Feedback (Feedback Sensor Option)	5
30	114995-010	1	Screw, Cap, Socket, Flat, Countersunk (Feedback Sensor Option)	5
31	5990203-001	1	Magnet Carrier (Feedback Sensor Option)	5
32	54999158	1	Adapter, Swash Sensor (Feed Sensor Option)	5
33	104166-021	1	O-Ring (Adapter / Swash Sensor Assy) ● (Feedback Sensor Option)	5
34	6024371-002	1	Feedback Sensor, Non-Contact (Feedback Sensor Option)	5
35	6027085-001	2	Screw, Cap S/A (Swash Sensor) (Feedback Sensor Option)	5
36	16026-406	1	Pin, Roll (Feedback Link) (Feedback Sensor Option)	5
37	6030096-350	1	Screw, Cap ◆ (Adjustable Maximum Stop Option)	5
38	692866	1	Nut Sealing ◆ (Adjustable Maximum Stop Option)	5
39	16133-12	1	O-Ring ◆ (Adjustable Maximum Stop Option)	5
40	937166	2	Tamper Proof Cap	–

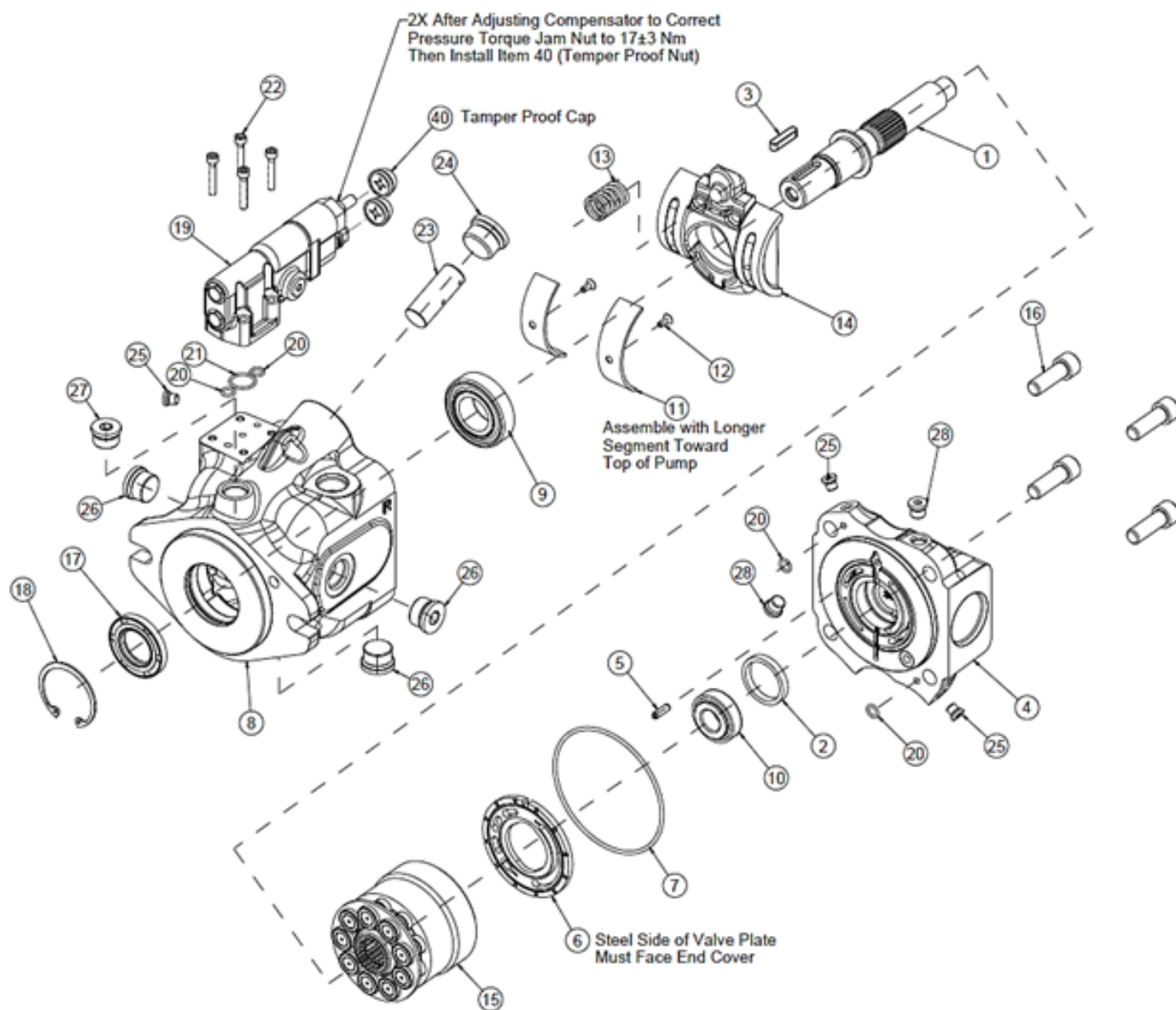
● Standard Seal Kit: 9900959-000

◆ Adjustable Maximum Displacement Volume Stop Kit: 9900958-000

■ Shaft bearing Shim Kit: 9900961-000

# Exploded Assembly - 220 Series Pump

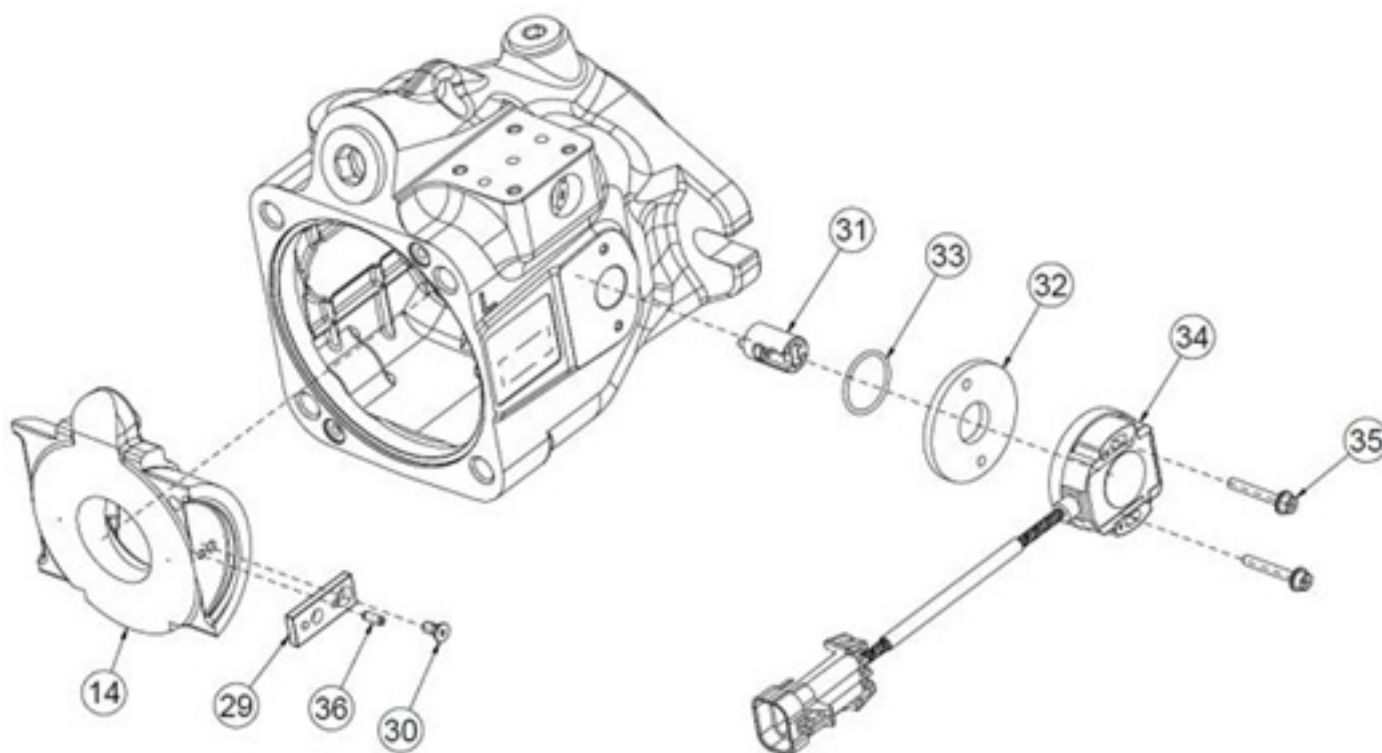
Part Item Number



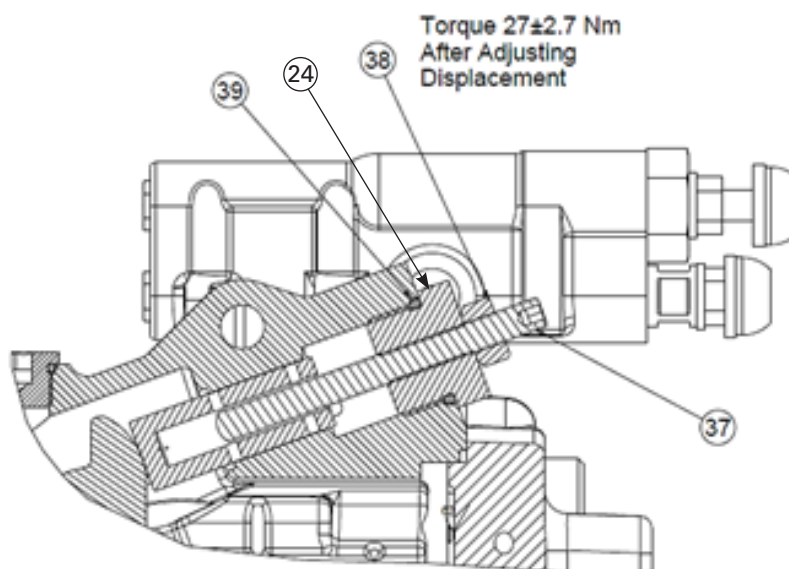
# Optional Assembly - 220 Series Pumps

Part Item Number

## Feedback Sensor Option

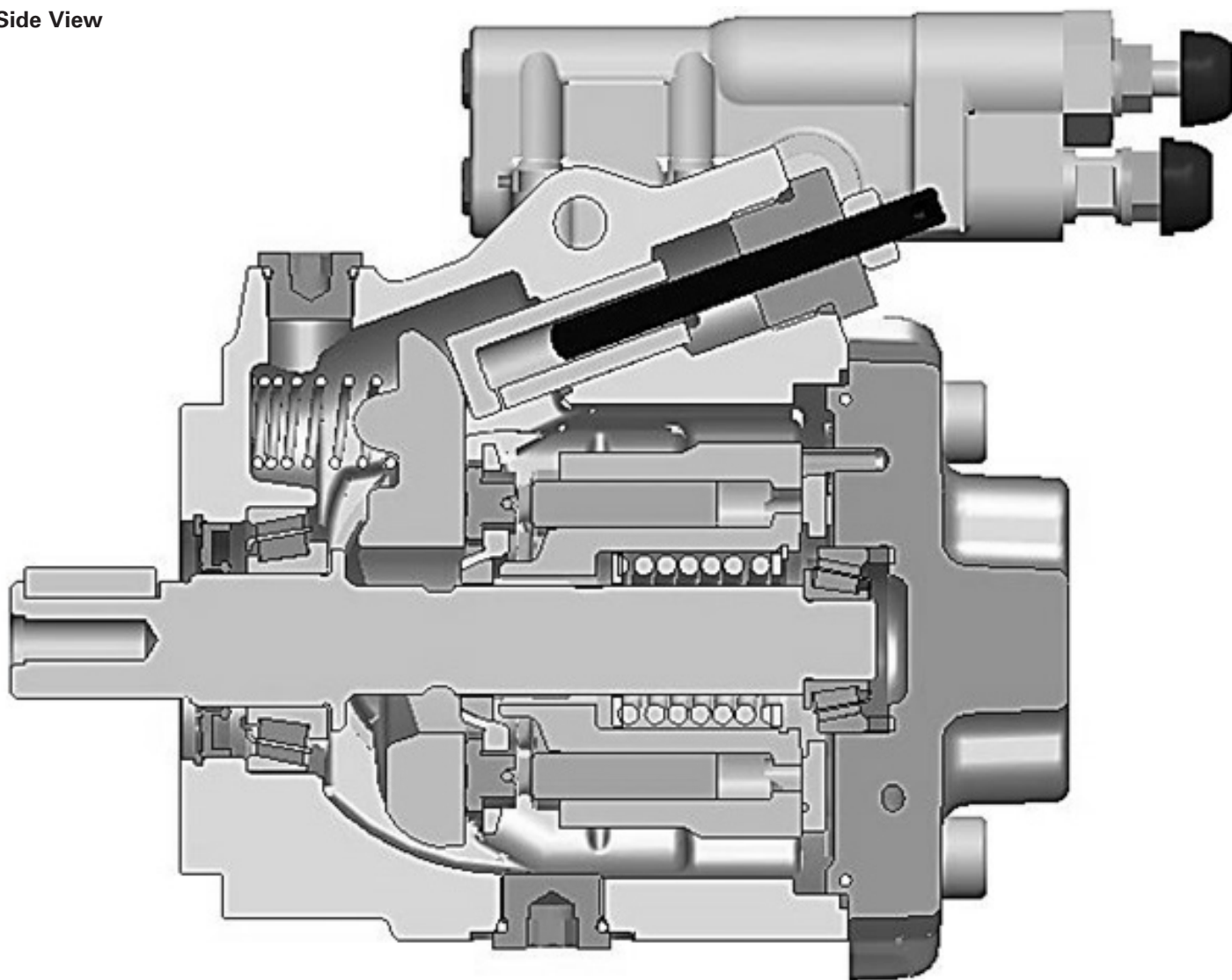


## Adjustable Maximum Stop Option



# Typical Cross Section - 220 Series Pumps

Side View



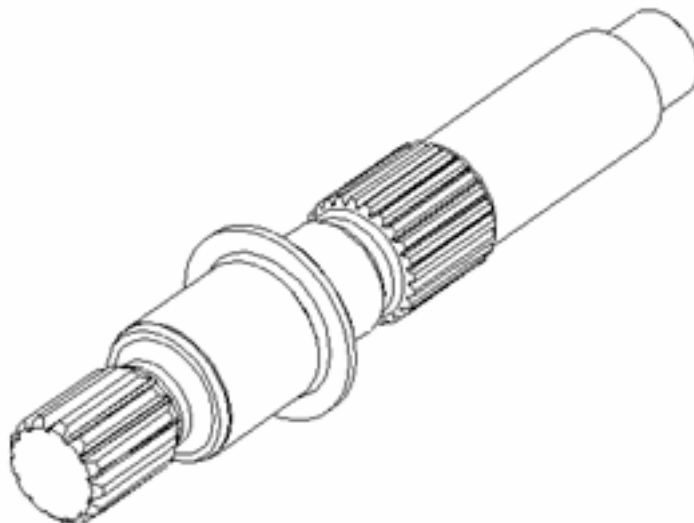
# Shaft, Drive and Key - Item 1 & 3

Table 1

**Table 1 - Shaft, Drive and Key (Items 1 & 3)**

<b>Code 4,5,6</b>	<b>Position 8,9</b>	<b>24,25</b>	<b>Key (Item 3)</b>	<b>Part Number</b>	<b>Description</b>
028	05	00	24500-619	6026704-003	Shaft, Drive, 22.2 Dia. Straight Key, 41 mm Ext.
028	09	00	-	6026704-001	Shaft, Drive, Input 13 Tooth 16/32, 41 mm Ext.
028	31	00	16246-516	6026704-002	Shaft, Drive, 25.4 Dia. Straight Key, 46 mm Ext.
028	34	00	-	6026704-004	Shaft, Drive, Input 15 Tooth 16/32, 46 mm Ext.

## 220 Series Mobile Piston Pump Drive Shaft





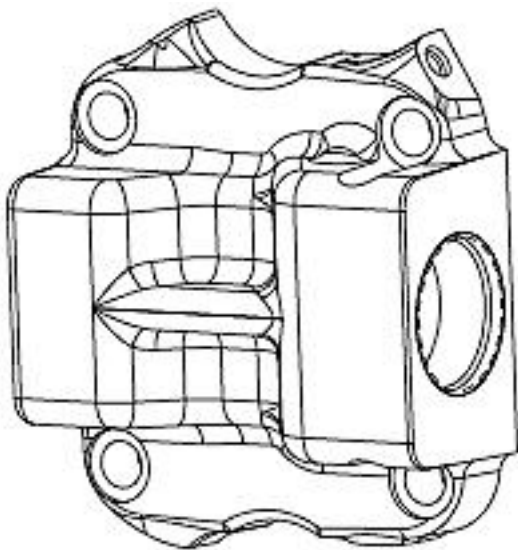
# End Cover S/A - Item 4

Table 2

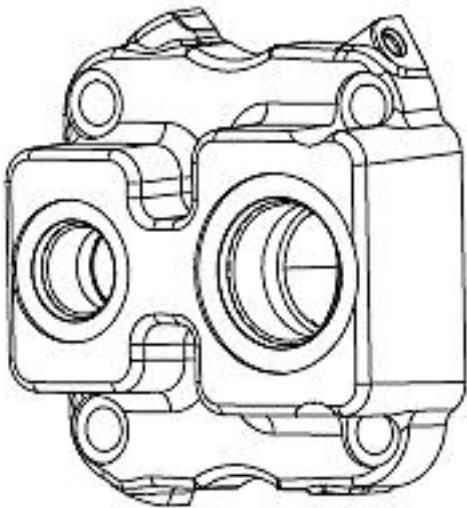
Table 2 - End Cover S/A (Item 4)

Code 4,5,6	Position 7	10,11	13	24,25	Part Number	Description
028	L,R	AA	1	00	6026786-002	End Cover S/A, Rear Port 28 cc (O-ring Port)
028	L,R	AB	1	00	6026786-001	End Cover S/A, Side Port 28 cc (O-ring Port)
028	L,R	AC	2	00	6026786-006	End Cover S/A, Rear Port 28 cc Metric
028	L,R	AD	2	00	6026786-005	End Cover S/A, Side Port 28 cc Metric
028	L,R	AE	1	00	6026786-004	End Cover S/A, Rear Port 28 cc (4 Bolt Flange Port)
028	L,R	AF	1	00	6026786-003	End Cover S/A, Side Port 28 cc (4 Bolt Flange Port)

## 220 Series Mobile Piston Pump End Cover views



Side Port



Rear Port



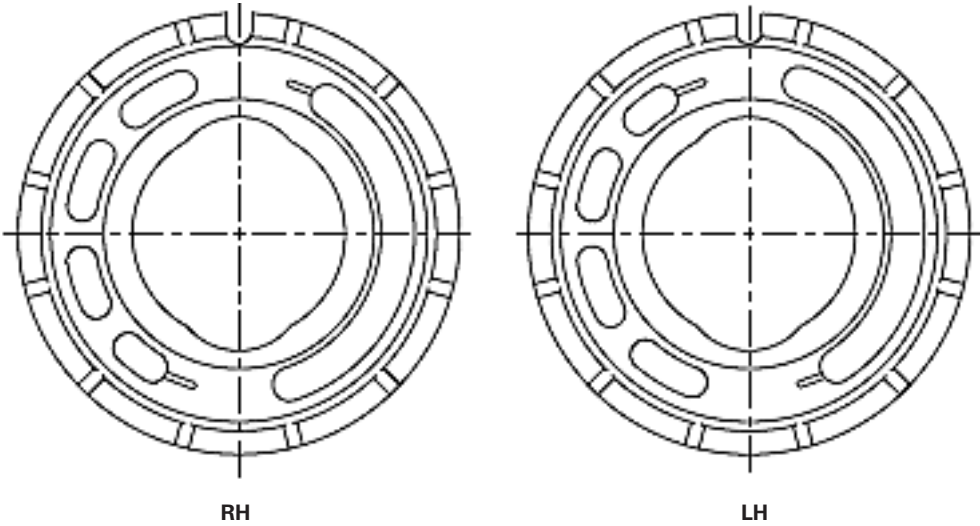
# Valve Plate - Item 6

Table 3

Table 3 - Valve Plate (Item 6)

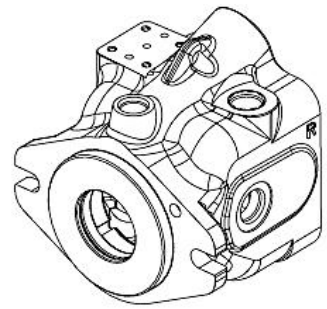
Code 4,5,6	Position 7	Part Number	Description
028	R	6029630-001	Plate, Valve (RH 28 cc)
028	L	6029630-002	Plate, Valve (LH 28 cc)

220 Series Mobile Piston Pump  
Valve Plate Identification



Housing - Item 8  
 Rotating Groups - Item 15  
 Swash Plate - Item 14  
 Shaft Seal - Item 17

Tables 4, 5, 6 & 7



**Table 4 - Housing (Item 8)**

Code Position 8,9	12	27,28	Part Number	Description
05,09,31,34	A,B,G	AB	6026919-001	Housing (Feedback Sensor)
05,09,31,34	A,B,E,G	00	6026919-002	Housing
05,09,31,34	C,D,F,H	00	6026919-003	Housing Metric Drain Port

**Table 5 - Rotating Group (Item 15)**

Code Position 4,5,6	Part Number	Description
028	6026982-001	Rotating Group S/A (28 cc)



**Table 6 - Swash Plate (Item 14)**

Code Position 4,5,6	Part Number	Description
028	6026917-001	Swash Plate (28 cc)



**220 Series Mobile Piston Pump  
 Swash Plate View**

**Table 7 - Shaft Seal (Item 17)**

Code Position 4,5,6	Part Number	Description
1	16253-218	Seal, Shaft, Fluorocarbon



**220 Series Mobile Piston Pump  
 Shaft Seal View**

# Compensator - Item 19

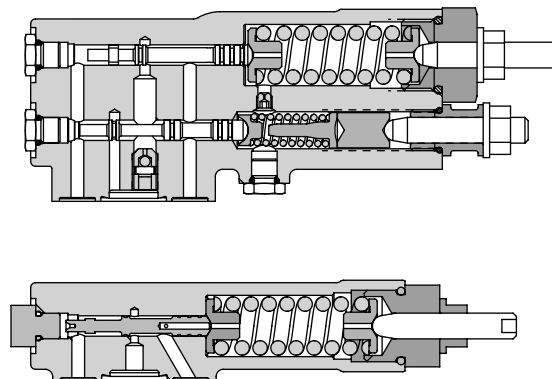
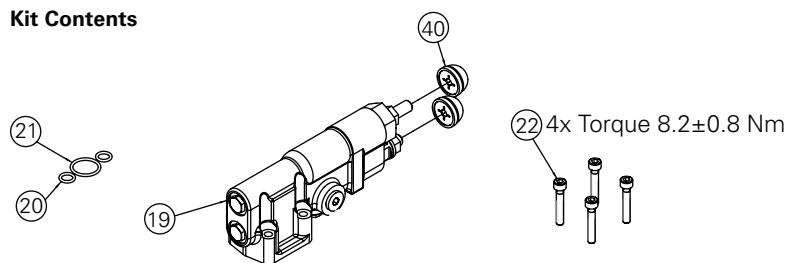
## Plug Subassemblies - Item 26, 27 & 28

Table 8, 9

**Table 8 - Compensator (Pump Controls) (Item 19)**

Control Code 14	Code 15,16	Pressure Limit Setting	Code 17,18	Flow Setting	Code 21,22	Kit Number
A	27	199.9-206.8 bar [2900-3000 lbf/in <sup>2</sup> ]	25	23.44-26.89 bar [340-390 lbf/in <sup>2</sup> ]	00	9900512-003
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	10	9.65-12.41 bar [140-180 lbf/in <sup>2</sup> ]	0A	9900512-013
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	00	9900512-022
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	0A	9900512-026
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	23	23.10-25.17 bar [335-365 lbf/in <sup>2</sup> ]	00	9900512-001
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	24	22.75-25.51 bar [330-370 lbf/in <sup>2</sup> ]	00	9900512-032
A	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	30	28.27-31.72 bar [410-460 lbf/in <sup>2</sup> ]	00	9900512-017
A	32	226.5-233.4 bar [3285-3385 lbf/in <sup>2</sup> ]	16	13.79-16.55 bar [200-240 lbf/in <sup>2</sup> ]	00	9900512-002
A	35	241.3-248.2 bar [3500-3600 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	00	9900512-028
A	36	246.5-253.4 bar [3575-3675 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	00	9900512-014
A	36	246.5-253.4 bar [3575-3675 lbf/in <sup>2</sup> ]	22	20.68-23.44 bar [300-340 lbf/in <sup>2</sup> ]	0A	9900512-031
A	40	262.0-268.9 bar [3800-3900 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	0A	9900512-005
A	40	262.0-268.9 bar [3800-3900 lbf/in <sup>2</sup> ]	10	9.65-12.41 bar [140-180 lbf/in <sup>2</sup> ]	00	9900512-027
A	42	272.4-279.3 bar [3950-4050 lbf/in <sup>2</sup> ]	10	9.65-12.41 bar [140-180 lbf/in <sup>2</sup> ]	00	9900512-007
A	42	272.4-279.3 bar [3950-4050 lbf/in <sup>2</sup> ]	10	9.65-12.41 bar [140-180 lbf/in <sup>2</sup> ]	0A	9900512-006
A	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	00	9900512-010
A	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	14	12.41-15.17 bar [180-220 lbf/in <sup>2</sup> ]	0A	9900512-015
A	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	16	13.79-16.55 bar [200-240 lbf/in <sup>2</sup> ]	00	9900512-008
A	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	24	22.75-25.51 bar [330-370 lbf/in <sup>2</sup> ]	00	9900512-018
B	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	24	22.75-25.51 bar [330-370 lbf/in <sup>2</sup> ]	00	9900512-012
B	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	28	26.20-28.96 bar [380-420 lbf/in <sup>2</sup> ]	0A	9900512-019
B	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	24	22.75-25.51 bar [330-370 lbf/in <sup>2</sup> ]	00	9900512-011
C	12	137.9-144.8 bar [2000-2100 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-021
C	19	168.9-175.8 bar [2450-2550 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-023
C	21	179.3-186.2 bar [2600-2700 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-029
C	28	206.8-213.7 bar [3000-3100 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-016
C	43	275.8-282.7 bar [4000-4100 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-009
C	45	306.8-313.7 bar [4450-4550 lbf/in <sup>2</sup> ]	00	No Flow Comp. Setting	00	9900512-004

### Kit Contents

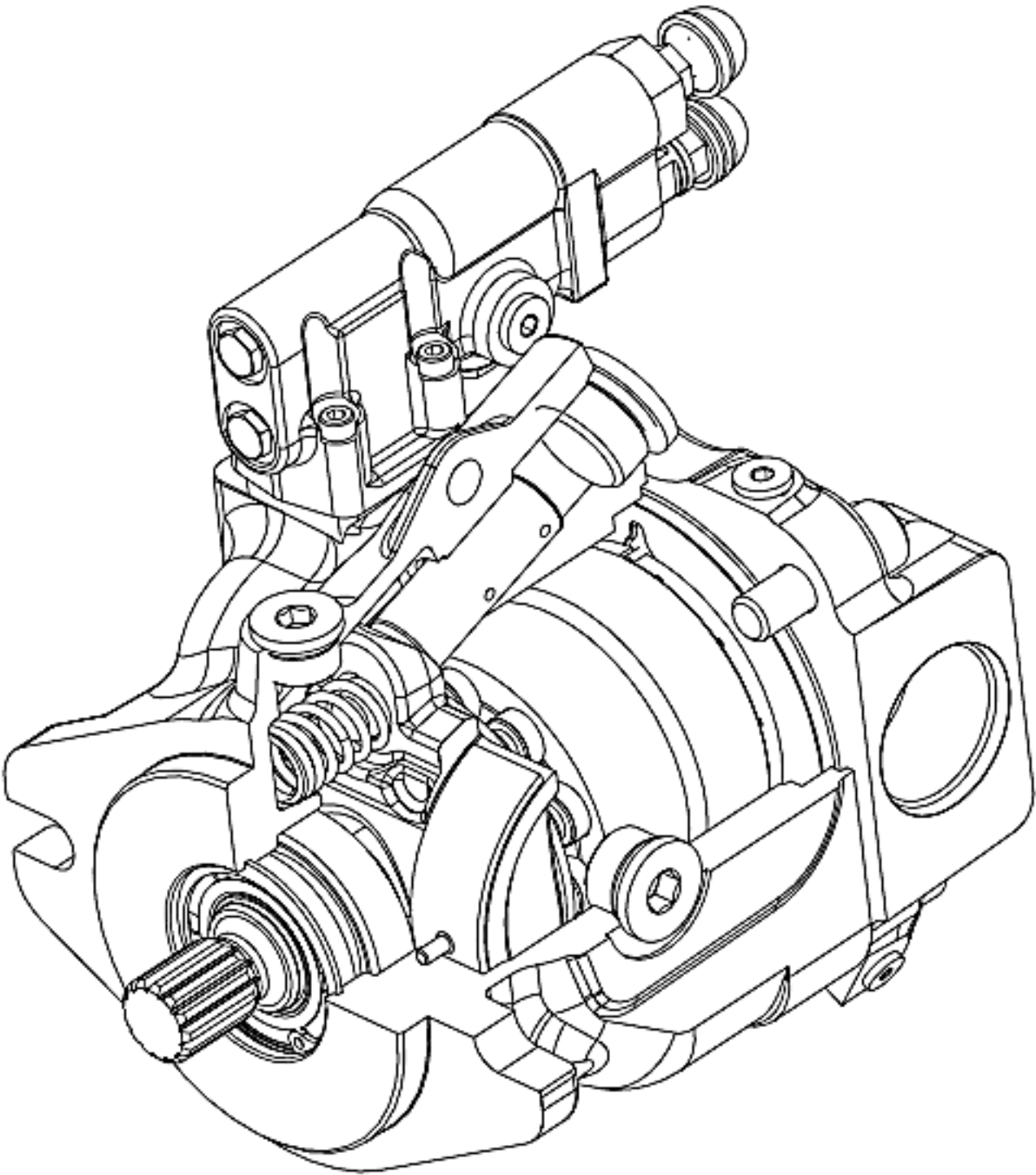


**Table 9 - Plug Subassemblies (Items 26, 27 & 28)**

Code Position 12	13	27,28	Part Number	Description
A,B,E,G	-	00,AB	16103-310	Plug (Bottom, Side and Top Case Drain) .875-14 UNF-2B Thd.
C,D,F	-	00,AB	9237-005	Plug (Bottom, Side and Top Case Drain) M22 X 1.5 Thd.
A,B,E	-	-	16103-308	Plug (Vertical Case Drain) .750-16 UNF-2B Thd.
C,D,F	-	-	9237-004	Plug (Vertical Case Drain) M18 X 1.5 Thd.
-	1	-	16103-304	Plug (Diagnostic Ports) .4375-20 UNF-2B Thd.
-	2	-	9237-002	Plug (Diagnostic Ports) M12 X 1.5 Thd.

# Pump Repair

Cut Section



# Pump Repair

## Cut Section

### 1. Remove Control Piston Plug Assembly



### 3. Remove Compensator



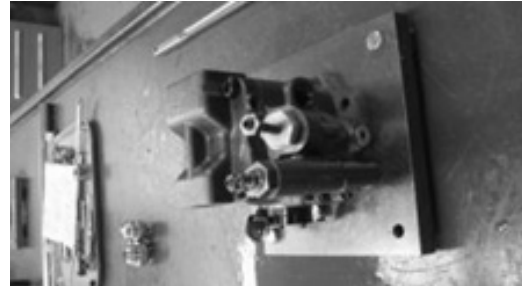
### 5. Remove O-ring Seal



### 7. Remove Bearing Race The bearing race is pressed in and will require the use of a sliding bearing removal hammer or similar tool to remove it.



### 2. Install Swash Plate Locator Tool Adjustment will take place in step 11.



### 4. Remove End Cover Mark the housing and end cover to ensure orientation. Remove the four cap screws that hold the end cover in place.

Note: The valve plate may stick to end cover. Use caution so valve plate does not fall off.



### 6. Remove Valve Plate



### 8. Remove Bearing





# Pump Repair

Cont.

## 9. Remove Housing O-rings



## 11. Swashplate adjustment locator with the hold down tool in place, tighten the adjustment screw so the control piston spring is compressed.

Note: This step is designed to force the swashplate to a neutral position to enable easy removal of the rotating group, and to retain the swashplate.



## 13. Remove rotating group



## 15. Remove Swashplate Locator



## 10. Install Swashplate retainer install the swash plate hold down tool and tighten the cap screw. This will prevent the swash plate from moving.



## 12. Install Shaft Retainer Tool and tighten the set screw while being careful not to damage shaft.



## 14. Remove shaft remove shaft retainer tool and lift out shaft. Use caution when moving shaft through shaft seal.



## 16. Remove Swashplate Retainer



# Pump Repair

Cont.

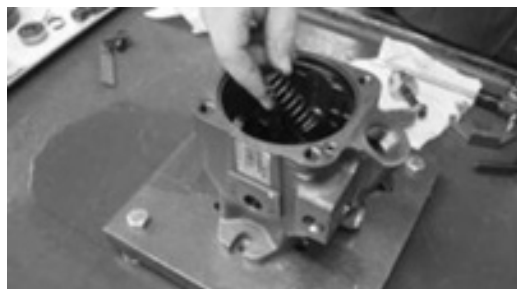
## 17. Remove Control Piston



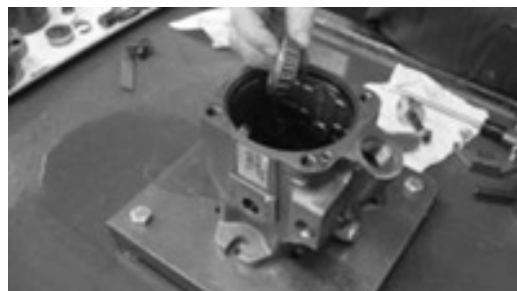
## 18. Remove Swashplate



## 19. Remove Bias Spring



## 20. Remove Bearing

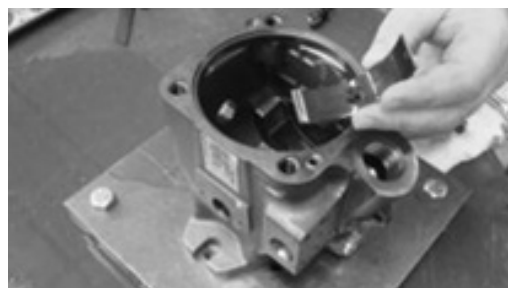


## 21. Remove Cradle Bearing Screws Caution: Socket head cap screws are easily damaged during repair with improper tool.



## 22. Remove Cradle Bearings Note: The cradle bearings are asymmetrical.

Note: Proper orientation shown in picture.



## 23. Remove Front Bearing Race



## 24. Remove Shaft Seal With the seal retaining ring removed use a punch or similar tool to knock out the shaft seal.





# Inspection, Repair and Part Replacement

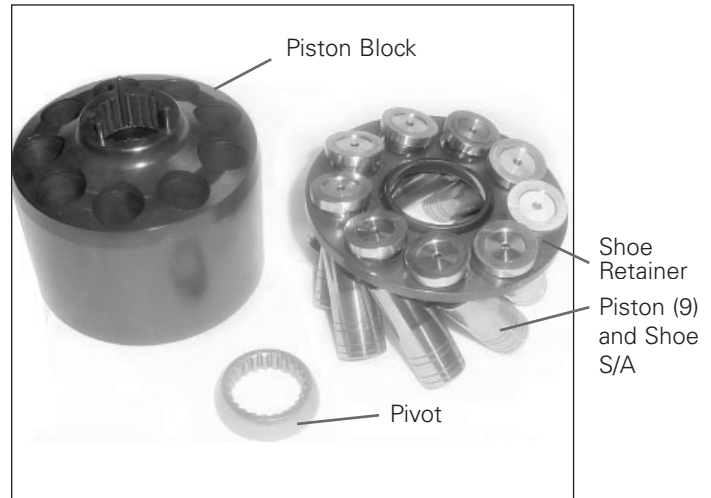
## Inspection

### Inspection

Before inspection of parts, clean with a solvent that is compatible with system fluid.

### Rotating Group Parts

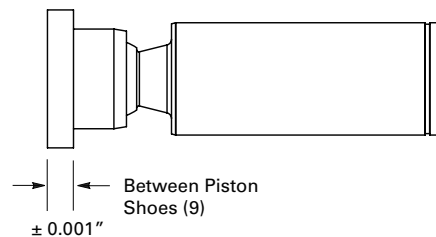
1. Inspect cylinder block face for wear, scratches, and/or erosion. If cylinder block condition is questionable, replace the entire rotating group.
2. Remove the pistons, shoe retainer, and pivot from piston block. The piston block assembly doesn't need to be disassembled unless the internal pins or spring are damaged.
3. Check each cylinder block bore for excessive wear. Use the piston and shoe S/A for this purpose. The pistons should be a very close fit and slide in and out of the cylinder block bores. **NO BINDING CAN BE TOLERATED.** If binding occurs, clean the cylinder block and pistons. Lubricate the cylinder block bores with clean fluid and try again. Even minor contamination of the fluid may cause a piston to freeze up in a cylinder bore.
4. Inspect each of the nine piston and shoe S/A for a maximum end play of 0.005 inch between the piston and shoe. Also check the face dimension of each shoe. The face dimension must be within 0.001 inch.
5. Inspect shoe retainer and pivot for wear and/or scratches. If condition is questionable, replace entire rotating group.



**Note:** Do not lap the face of piston block assembly.

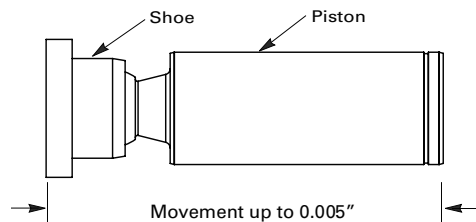
### Piston S/A Tolerances

This dimension must be maintained on all nine shoes within 0.001 inch.



Shoe face rides on swash plate. Shoe must swivel smoothly on ball.

End play must not exceed 0.005 inch.



# Inspection, Repair and Part Replacement

## End Cover & Associated Parts

1. Inspect end cover for erosion, cracks, and burrs. Clean up minor burrs with an India stone. If erosion or cracks are found, replace the end cover.
2. Inspect roller bearing and bearing race for nicks and pitting. Make sure the roller bearing turns freely within the bearing race. If the roller bearing needs replacement, both the roller bearing and the bearing race must be replaced.
3. Inspect valve plate for erosion, excessive wear, heavy scratches, and cracks. If any of the above conditions are found, replace the valve plate.
4. Inspect control piston and maximum displacement screw for burrs, scratches and cracks. Clean up minor scratches with 500 grit paper. Remove burrs with an India stone. The control piston should move freely in the bore.

## Swashplate Parts

1. Inspect swashplate face for wear, roughness or scoring. Check the swashplate hubs and bearing surfaces for wear and cracks. Replace if defective.
2. Inspect saddle bearing surfaces for wear, pitting, and smooth operation. Replace if necessary.

## Shaft/Housing Parts

1. Inspect drive shaft for wear, stripped splines, and burrs. Remove burrs with an India stone. Inspect the contact area of bearing and shaft seal). Replace the drive shaft if wear or scoring is greater than 0.005 T.I.R. (total indicator reading).
2. Inspect drive shaft bearing for roughness, pitting of rollers, and excessive end play. Replace, if defective. If the bearing needs to be replaced, the bearing race also requires replacement.
3. Inspect housing mounting flange for nicks and burrs. Remove minor nicks and burrs with an India stone. Also check the housing for damaged or stripped threads. If any thread is damaged, replace the housing.
4. Check remaining pump parts for excessive wear, damaged threads, burrs, cracks and erosion. Replace any part that is in questionable condition.

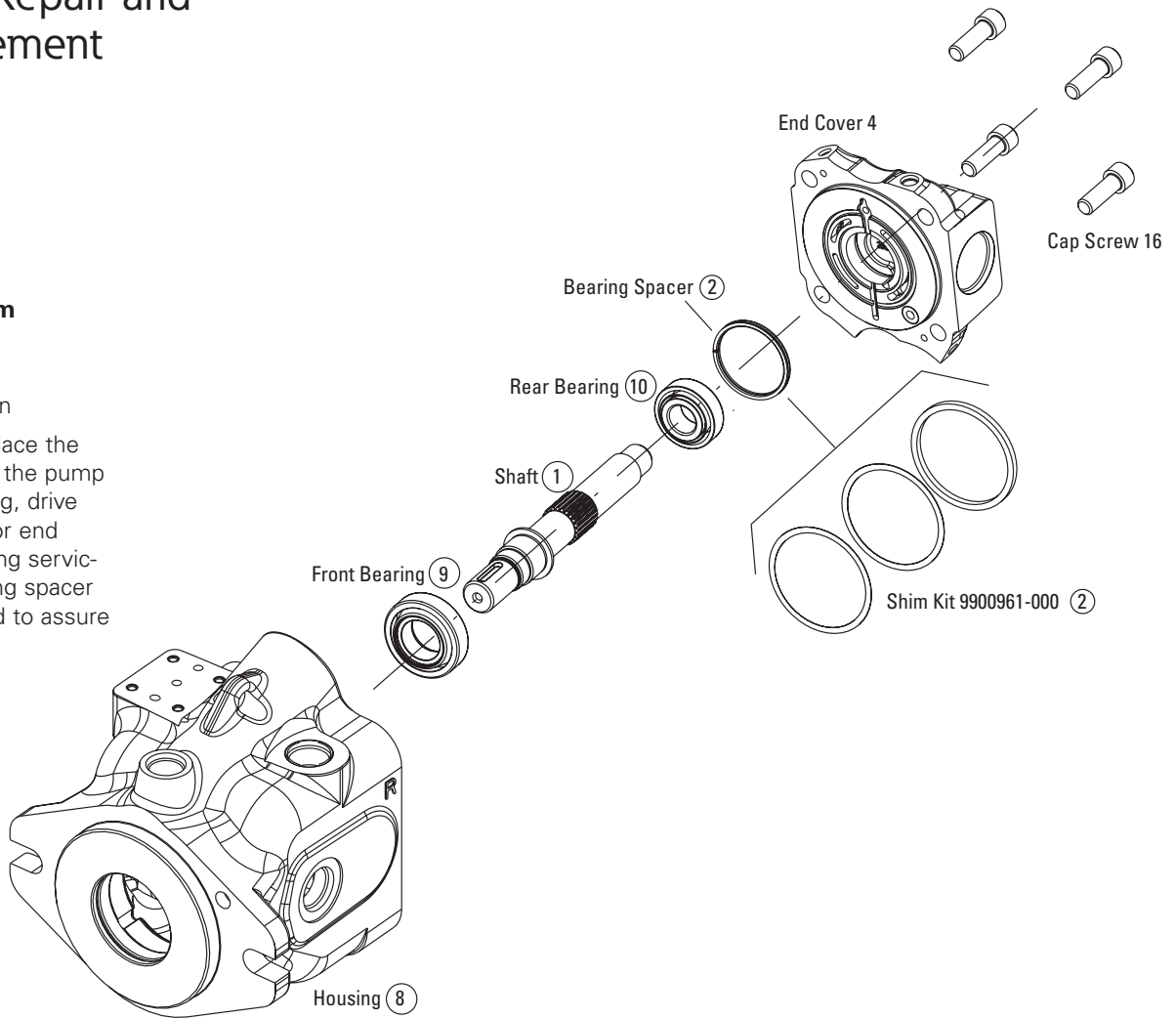
# Inspection, Repair and Part Replacement

## Shimming Process

### Shafty Bearing Shim Kit 9900961-000

#### Shimming Process Installation Information

This shim kit is to replace the bearing spacer within the pump housing. If the housing, drive shaft, shaft bearings or end cover is replaced during servicing, the original bearing spacer can no longer be used to assure proper bearing set.



### Shimming Procedures

1. Measure the thickness of the existing bearing spacer.
2. To obtain a starting point, stack shims to a few thousandth of an inch less than the measurement of existing bearing spacer. Then insert shims into the end cover in the same location as the removed bearing spacer.
3. Assemble the housing (without interface O-ring seals), shaft bearings, shaft and end cover. Install the end cover cap screws and torque to  $114 \pm 11$  Nm.
4. Using a dial indicator, measure drive shaft end play. Target bearing set range is .0005" to .003" clearance (no preload). Add or remove shims to achieve proper bearing set. If no movement of the shaft is observed, shims will need to be removed and steps 3 and 4 repeated.
5. Finish the assembly of the pump.



# Assembly

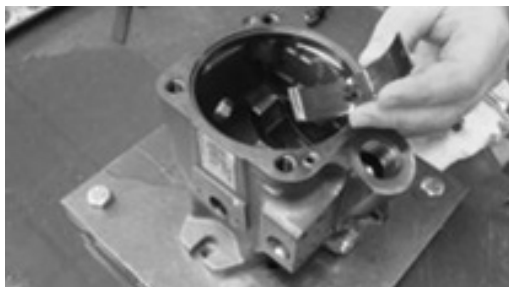
## 1. Install Snap Ring and Shaft Seal



## 2. Insert the Shaft Bearing Race



## 3. Install Cradle Bearings



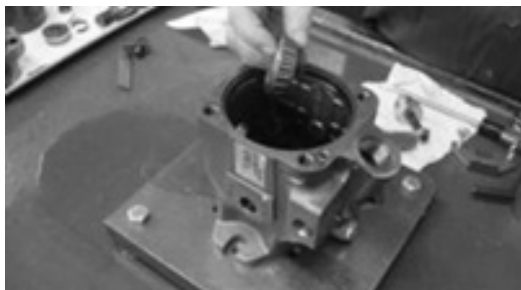
Note: The cradle bearings are asymmetrical. Install as shown in picture.

## 4. Install Cradle Bearing Screws

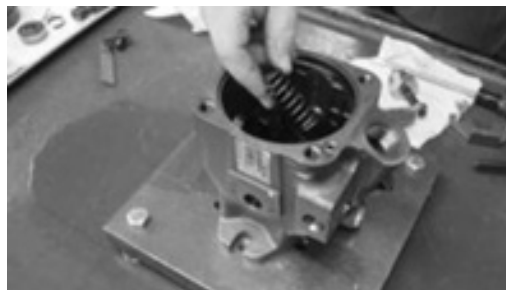


Note: The old cap screws cannot be reused and must be replaced with new ones because the screws will be damaged during disassembly. The new cap screw threads will be coated with loctite. (2) bearings item 11 and (2) screws item 12.

## 5. Install Bearing



## 6. Install Bias Spring



## 7. Install Swashplate



Note: With the bias spring in place, tilt the swash plate toward the spring and install the swash plate.

## 8. Install Control Piston



# Assembly

## 9. Install Swashplate Retainer



## 10. Install Swashplate Locator



Note: Adjust the screw until the swashplate is near neutral (will look flat in housing).

## 11. Install Shaft



Caution: Use care while inserting shaft end through shaft seal.

## 12. Install Shaft Retainer Tool



## 13. Install the Rotating Group



## 14. Remove Swashplate Locator



## 15. Remove Swashplate Retainer



## 16. Install O-ring Seal



# Assembly

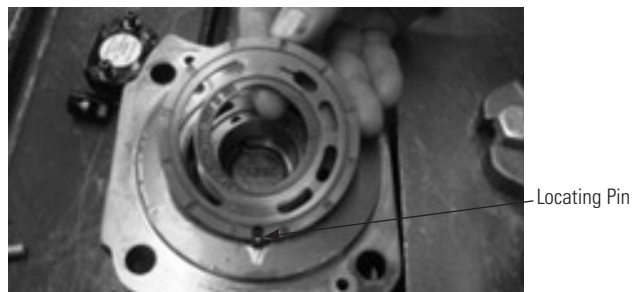
## 17. Install Housing O-rings



## 18. Install Bearing Race into End Cover



## 19. Install Valve Plate



Note: Lightly coat the back plate side of the valve plate with petroleum jelly for retention during assembly. Install the valve plate over the bearing race aligning the small slot on the outside of the valve plate with the roll pin in the end cover.

## 20. Install Bearing onto Shaft



## 21. Install End Cover



Note: Ensure correct orientation. Use caution so valve plate does not fall off.

## 22. Install Compensator



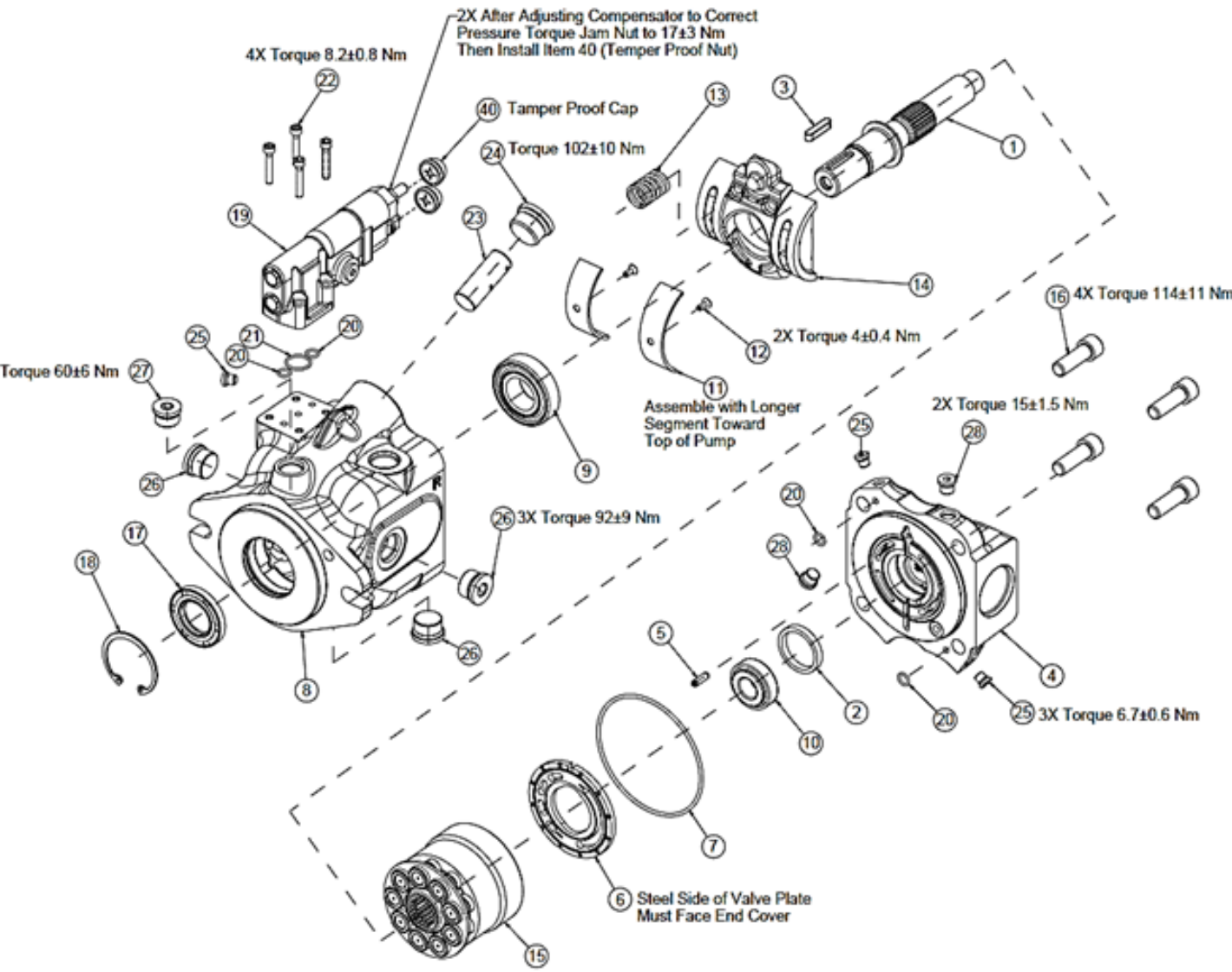
## 23. Testing

Perform functional test on pump according to Eaton test procedure. Contact your area sales manager for more information.

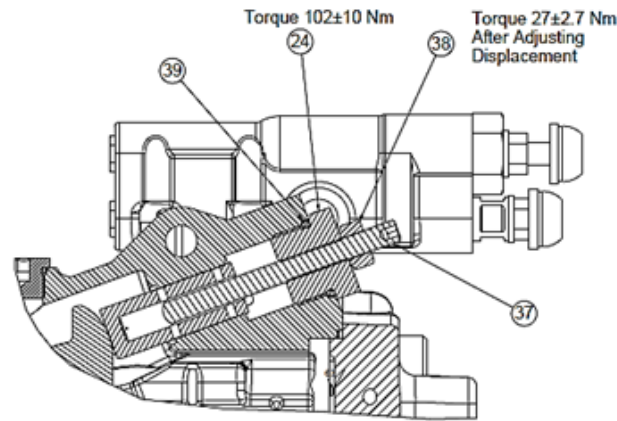


# Assembly Torque Values

## Instructions

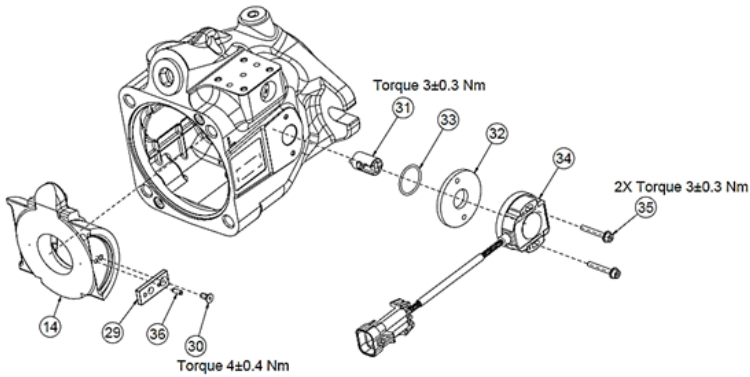


### Adjustable Maximum Stop Option



### Assembly Torque Values - Instructions

#### Feedback Sensor Option







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